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ORIGINAL ARTICLE

The effects of a magic-based intervention on self-esteem, depressive symptoms, and quality of life among community-dwelling older adults: a randomised controlled trial

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Abstract

Background: Magic-based programs have been utilised to enhance well-being across various health aspects. However, there is a lack of studies on whether performing magic tricks can provide mental health benefits for older adults living in the community. Therefore, this study aims to investigate the effects of a magic-based intervention program on self-esteem, depressive symptoms, and quality of life (QOL), and to examine the relationship between these factors in older adults.

Methods: Thirty-eight participants, aged 60–90 years, were randomly assigned to either a magic intervention group or a control group. The magic intervention program, tailored for older adults, was conducted for 90 min, twice weekly, over 6 weeks. The Rosenberg Self-Esteem Scale (RSE), the 15-item Geriatric Depression Scale (GDS-15), and the World Health Organization Quality of Life-BREF scores were measured and analyzed in both groups before and after the intervention.

Results: The magic-based intervention significantly increased self-esteem and reduced depressive symptoms in older adults, with large effect sizes. However, no significant impact on QOL was observed. Additionally, no significant correlation was found between the improvement in self-esteem and the reduction in depressive levels. Despite this, a moderate but significant negative correlation was detected between the post-intervention scores of RSE and GDS-15 in the magic intervention group.

Conclusions: The study demonstrated that the magic intervention program was beneficial in promoting mental health in community-dwelling older adults. Implementing magic programs in communities appears to be an effective approach to enhance self-esteem and alleviate depressive symptoms in the older population.

INTRODUCTION

Psychological well-being is essential for overall health and effective functioning.[1] However, around 7% of older adults face challenges in their psychological well-being due to depression.[2,3] Individuals experiencing depression or a depressive mood often face a loss of interest and appetite, sleep disturbances, and a diminished quality of life (QOL).[4,5] This condition can lead to various physical and psychological challenges, increase mortality risk, and consequently, heighten societal burdens.[4,6–9] As a result, health promotion programs fostering psychological resilience among older people are becoming increasingly important. Effective management of depressive symptoms can help restore mental health and enhance QOL for this population.[10]

Self-esteem represents an individual's self-assessment.[11,12] High self-esteem arises from a sense of personal value,[13] while low self-esteem, a risk factor for depressive symptoms, can predict and contribute

to depression,[14–16] as suggested by the vulnerability model.[17] Consequently, interventions aimed at enhancing self-esteem may prevent or mitigate depression across genders and ages, potentially yielding long-lasting, positive mental health impacts beyond merely reducing short-term depression risks.[17,18]

Psychosocial interventions, which target psychological or social factors instead of biological factors,[19,20] aim to improve various aspects of well-being, such as physical, psychological, cognitive, behavioural, and social well-being.[21] These interventions have demonstrated effectiveness in boosting self-esteem, alleviating depressive symptoms, and enhancing QOL for older adults.[22,23] A systematic review and meta-analysis of 69 controlled studies found that psychosocial interventions, including skill training, group support, and social activities, improved positive mental health and QOL while reducing depressive symptoms in older adults without mental disorder diagnoses.[23]

Magic is an art form that elicits wonder and entertains by defying the laws of nature. Magic-based interventions integrate elements of magic to develop psychosocial interventions, which share similarities with skill training and social activity interventions. The connection stems from the process of acquiring and practising new techniques as well as engaging with others through both verbal and non-verbal communication. Magic-based interventions have been employed to enhance well-being in various domains, such as psychological, social, physical, and cognitive health.[24–27] They have been used to boost self-esteem, self-confidence, rapport, and interaction skills, and improve interpersonal interactions.[28–42] Levin (2006) reported positive gains in self-esteem for six pre-adolescent boys after a 6-week magic curriculum.[37] Similarly, college students participating in magic workshops experienced greater self-esteem and well-being benefits compared to those in mindfulness workshops, as shown by a qualitative analysis.[42] Also, Bagienski *et al*. observed increased self-efficacy in 75 adolescents after mastering a magic trick considered impossible.[43]

Success in meeting expectations in a valuable area, such as magic, can increase self-esteem.[44] The self is created by the opinions of others[45] and performing magic helps to gain social support and build positive relationships, and may thus increase self-esteem.[42] Through a generalised self-efficacy, mastery of magic can be extended to other areas, particularly when magic is valued by the individual, and the self-efficacy of performing magic may mediate self-esteem enhancement.[43] In short, learning and performing magic tricks for an audience can improve self-esteem, a key aspect of psychological well-being, and potentially alleviate depressive symptoms in older adults.[23,46]

Nonetheless, to date, only two studies have investigated the effects of magic-based intervention on the mental health of older adults. Bedini (2008) found that a 10-week magic-based intervention improved self-esteem and reduced depression in nine supportive care home residents. However, this study had a small sample size and was qualitative in nature, lacking the support of statistical data.[41] In another pilot randomised controlled trial, a 6-week magic program led to decreased depression among institutionalised older adults. Yet, due to the small sample size of only 12 participants and potential interference between experimental and control groups, the evidence was insufficient.[47] Consequently, there is a pressing need for comprehensive research focusing on older adults to provide robust academic evidence supporting the benefits of magic-based interventions in promoting mental health and well-being. This is particularly important from a preventive medicine perspective, as efforts to enhance mental health in community-dwelling older adults would be more valuable.

Our research group previously conducted a magic-based intervention study targeting older patients with mild cognitive impairment, demonstrating the potential of such interventions for neurocognitive improvement.[48] Yet, no prior studies have explored the effects of magic-based interventions on psychological indices and QOL in community-dwelling older adults without major neurological or psychiatric diseases. Therefore, the primary aim of the present study is to investigate the potential effects of a 6-week magic-based program on self-esteem, depressive symptoms, and QOL in community-dwelling older adults. We hypothesise that a 6-week magic-based intervention can improve self-esteem levels, reduce depressive symptoms, and increase QOL in this population. The secondary aim is to examine the relationships between changes in self-esteem and depressive symptoms, as well as between changes in depressive symptoms and QOL. We hypothesise that participants experiencing greater

improvement in self-esteem after the magic-based intervention will also exhibit a larger reduction in depressive symptoms and a more significant improvement in QOL.

METHODS

Study design

This prospective, randomised controlled trial was conducted in Tainan, Taiwan, between September 2021 and May 2022. Participants were assigned to either the experimental group, which received the magic intervention, or a control group. The study was approved by the Institutional Review Board of the National Cheng Kung University Hospital (A-BR-110-159), and written informed consent was obtained from all participants.

Participants

Participants were recruited from a community activity centre and outpatient family medicine clinics within a community hospital. Eligible volunteers met the following criteria: (i) aged between 60 and 90 years; (ii) not currently using antidepressant medication; (iii) without current issues of alcohol and/or substance dependence; (iv) without a primary axis I psychiatric diagnosis; (v) not currently undergoing psychotherapy; (vi) scoring ≥24 on the Mini-Mental State Examination (MMSE); and (vii) scoring ≤10 on the 15-item Geriatric Depression Scale (GDS-15). Individuals were excluded if they: (i) had medical conditions associated with depressive symptoms (e.g., thyroid disease, hyperparathyroidism, Cushing's syndrome, adrenal insufficiency, acute hepatitis, acute kidney injury, anaemia, systemic infectious disease, and/or malignancy); or (ii) had an acute, unstable neurological disease (e.g., acute stroke within the past 6 months and/or dementia with behavioural and psychological symptoms).

Randomisation and blinding

A trained research assistant collected sociodemographic data, including age, gender, body height, body weight, body mass index, marital status (e.g., living with a spouse or others), educational level (whether higher education was attained, defined as having completed more than 12 years of formal education), employment status (employed or not), financial status (either middle- or low-income household or others), Barthel Index of Activities of Daily Living (ADL) scores, and MMSE scores. Following the completion of pre-intervention assessments, participants were allocated to either the magic intervention group or the control group using stratified randomisation based on recruitment sources and gender.

Magic-based intervention

All participants in both groups received health education on mental health at the beginning of the intervention (week 0). The magic intervention program, tailored for older adults, commenced 1 week later, and was conducted for 90 min twice weekly over a 6-week period. The program was led by an experienced instructor who was both a family physician and a professional magician, certified as a tutor of the Programs to Prevent or Delay Disability by the Ministry of Health and Welfare.

The course design emphasised self-working parlour magic, eliminating the need for elaborate manipulation or complex techniques, and requiring verbal expression and audience interaction for successful performances. Each magic lesson, except for the first and last sessions, included: (i) a 10-min review of previously taught magic tricks; (ii) a 5-min demonstration of new magic tricks by the instructor; (iii) a 10-min discussion of the possible explanations behind the magic tricks; (iv) a 5-min revelation of the secrets behind the gimmicks and magic tricks; (v) a 25-min session for participants to make their props using materials such as scissors, paper, tape, and coloured pens; (vi) a 20-min practice session for participants to perfect their performance skills; and (vii) a 15-min group presentation of their magic shows on stage (Supplementary Table S1). The program comprised a total of 12 lessons, each with a distinct theme (Table 1 and Supplementary Fig. S1).

Participants in the control group maintained their regular routines and daily activities. In the seventh week, post-intervention assessments were completed by all participants from both groups.

Outcome measures

The Rosenberg Self-Esteem Scale (RSE)

The RSE is a scale used to measure self-esteem for individuals of various ages, nations, and cultures. It has good test–retest reliability, internal consistency, and validity.[13,49–52] The scale comprises 10 items, of which five are reverse-scored items. The positive-worded items (1, 3, 4, 7, 10, and) are scored from

Table 1 Themes of the 12 magic lessons in the magic intervention program

Lessons	Themes
Lesson 1	Welcome party: after a professional magic show, the instructor demonstrated how magic tricks can be performed with daily items such as rubber bands, bank notes, and coins. The participants introduced themselves to each other.
Lesson 2	A coin disappeared when covered with a transparent cup.
Lesson 3	A rocket slowly lifted off without power.
Lesson 4	A monkey fixed on a straw backflipped by itself.
Lesson 5	A rolled newspaper grew into a large flowering tree.
Lesson 6	A black-and-white butterfly turned colourful after it flew out of its frame.
Lesson 7	A gliding hub made the wool change colour.
Lesson 8	A paperclip was put into an envelope and turned into a banknote.
Lesson 9	An upright poker card supported the weight of a heavy object. Another selected poker card out of a deck changed suit by itself.
Lesson 10	Flowers and silk scarves were taken out from an empty bucket.
Lesson 11	A hundred-dollar bill in a wallet turned into a thousand-dollar bill.
Lesson 12	The grand show: Each participant performed a magic trick of their choice on stage for their classmates and friends.

4 (strongly agree) to 1 (strongly disagree), while the negative-worded items (2, 5, 6, 8, 9, and) are scored from 1 (strongly agree) to 4 (strongly disagree). The total score ranges from 10 to 40, with higher scores indicating higher self-esteem.

The 15-item Geriatric Depression Scale (GDS-15)

The GDS-15 is a widely used and validated tool for assessing depressive status among older people, with good sensitivity and specificity.[53,54] The Chinese version of the GDS-15 has also been validated.[55] Each item is scored 1 or 0 for a 'yes' or 'no' response, except for the reverse-scored items (1, 5, 7, 11, 13, and). The total score ranges from 0 to 15, with higher scores indicating more depressive symptoms.

The brief version of the World Health Organization QOL Questionnaire Taiwan version (WHOQOL-BREF-TW)

The WHOQOL-BREF-TW is a questionnaire that is commonly used to evaluate QOL among Taiwanese populations[56] with good reliability and validity.[57] The questionnaire includes 28 items, with two general questions about overall QOL and general health, and the remaining 24 items categorised into four domains: physical health (seven items), psychological (six items), social relationships (four items), and environment (nine items). Scores for each domain are converted to a 0–100 scale according to the scoring guideline,[58] with higher scores indicating better QOL.

Sample size calculation

In most studies utilising magic-based interventions to increase self-esteem, participants were children or young adults, rendering them not directly comparable to the present study. One study involved older adults, but it was a qualitative study.[41] Another study was a pilot randomised controlled trial that focused solely on depressive symptoms without investigating self-esteem; moreover, the participants were institutionalised older adults, which limited its applicability to our study.[47] Therefore, we assumed a medium effect size with Cohen's f of 0.25[59] for the present study. We used G*Power software[60] for a priori sample size estimation and found that a sample size of 34 ($\alpha = 0.05$, 1-$\beta = 0.80$) was sufficient to detect a medium effect.

Statistical analysis

Sociodemographic data were reported as either the arithmetic mean ± standard deviation for continuous variables or as percentage for categorical variables. The independent *t*-test was used to compare continuous variables between the magic and control groups, while Pearson's Chi-square test was employed for categorical variables. The expectation–maximisation algorithm (EM algorithm)[61] was employed to impute missing data in accordance with the intention-to-treat principle.[62,63]

The primary outcomes of the study were post-intervention self-esteem levels, depressive status, and QOL in the participants. A repeated measures analysis of variance (RM-ANOVA) was conducted to compare pre- and post-intervention scores of RSE, GDS-15 and WHOQOL-BREF-TW in a 2 (group: intervention vs. control) × 2 (time: pre-intervention vs. post-intervention) setting. The equality of error variances by Levene's test was used to test for homogeneity. If a significant group × time interaction was detected in RM-ANOVA, a

post hoc test of the simple main effect was conducted for each dependent variable using the Bonferroni method. The secondary outcomes, the relationships between changes in self-esteem and depression levels as well as between changes in depression and QOL levels before and after the magic intervention, were examined using Pearson's correlation coefficients. A two-tailed *P*-value less than 0.05 was considered statistically significant. We also performed a posteriori power analysis using the G*Power software to determine the achieved power level.

RESULTS

Recruitment

A total of 38 older adults who met the inclusion criteria were enrolled in the study, with 24 from

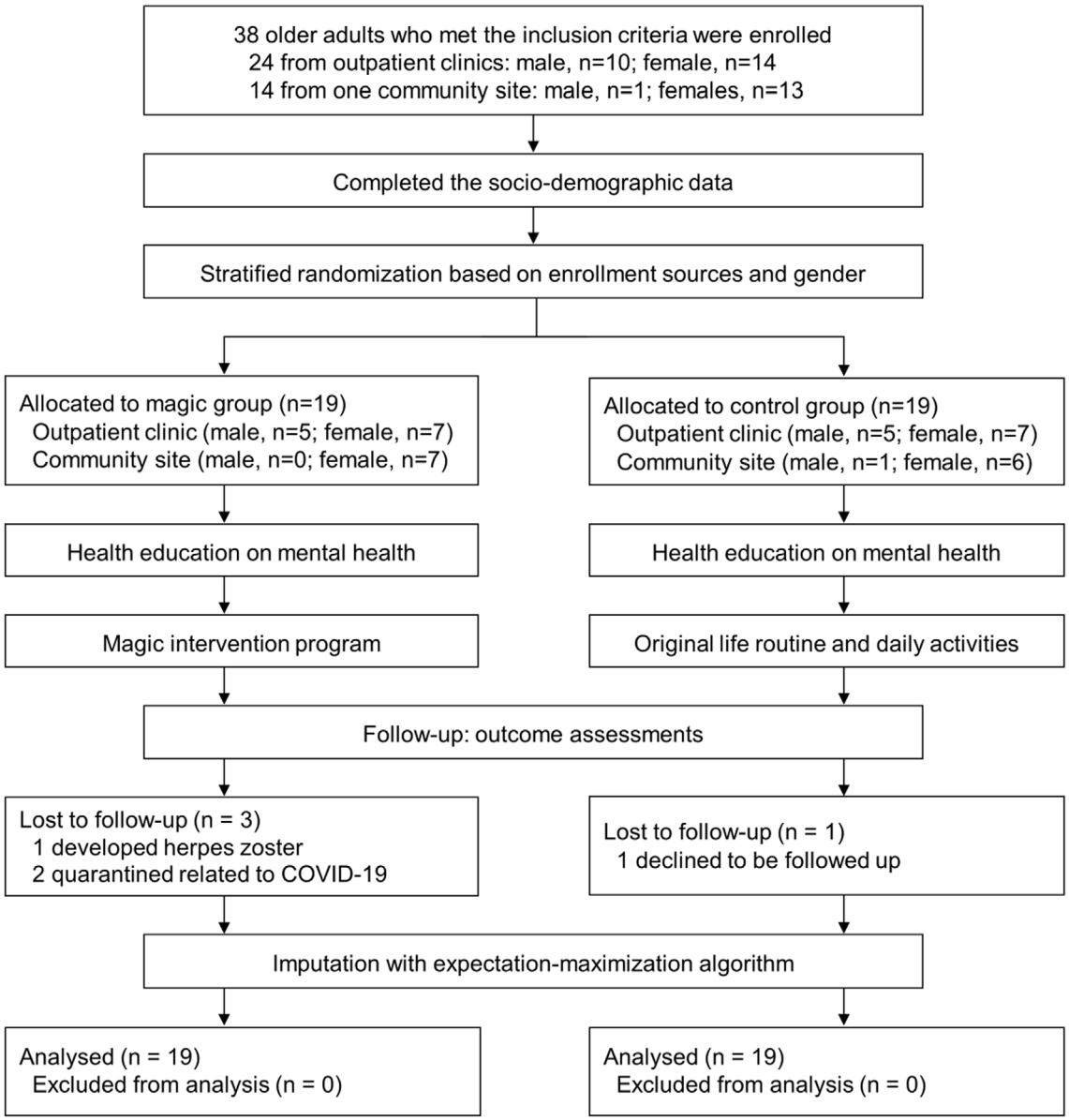

Figure 1 Flowchart of the study. Thirty-eight older adults who met the inclusion criteria were enrolled and allocated to the magic intervention group ($n = 19$) and the control group ($n = 19$) by stratified randomisation. Three participants in the magic intervention group did not complete the post-intervention assessment due to one developing herpes zoster and two being kept in home quarantine due to Coronavirus Disease-2019. One participant in the control group chose not to complete the post-intervention assessment.

outpatient clinics and 14 from a community activity centre. Using stratified randomisation, 19 participants were allocated to both the magic intervention group and the control group. Three participants in the magic intervention group did not complete the post-intervention assessment due to one developing herpes zoster and two being kept in home quarantine due to Coronavirus Disease-2019. One participant in the control group chose not to participate in the post-intervention assessment (Fig. 1). Because dropouts occurred due to personal reasons rather than regulatory issues, missing data were considered to be missing at random. The dropout rates were relatively low, at 15.8% in the intervention group and 5.3% in the control group. Therefore, the EM algorithm was used to impute the missing data. A complete pre- and post-intervention case analysis was conducted, and the results remained robust.

Sociodemographic characteristics

The enrolled participants had a mean age of 72.0 years, and there were no significant differences in sociodemographic characteristics or baseline RSE, GDS-15, and WHOQOL-BREF-TW scores between the intervention and control groups (Table 2).

Mental health assessments

Figure 2 displays that the RM-ANOVA on RSE scores showed a significant main effect of time ($F(1, 36) = 21.17$, $P < 0.001$, $\eta_p^2 = 0.37$, $1\text{-}\beta = 1.0000$), with post-intervention RSE scores (30.19 ± 3.11) being higher than pre-intervention RSE scores (27.76 ± 3.58) across both groups. The effect of time was replaced by the significant group $\times$ time interaction, ($F(1, 36) = 8.95$, $P = 0.005$, $\eta_p^2 = 0.20$, $1\text{-}\beta = 1.0000$). Post hoc analysis indicated that the mean post-intervention RSE score (31.26 ± 3.15) was significantly higher than the mean pre-intervention RSE score (27.26 ± 3.38) in the magic intervention group ($P < 0.001$).

The RM-ANOVA on GDS-15 scores revealed a significant group $\times$ time interaction ($F(1, 36) = 7.35$, $P = 0.010$, $\eta_p^2 = 0.17$, $1\text{-}\beta = 0.9997$). Post hoc analysis demonstrated that the mean post-intervention GDS-15 score (1.87 ± 2.31) was significantly lower than the mean pre-intervention GDS-15 score (3.53 ± 3.31) in the magic intervention group ($P = 0.004$).

QOL assessment

The RM-ANOVA on the overall QOL scores based on the WHOQOL-BREF-TW showed a significant main

Table 2 Sociodemographic characteristics of the participants

Sociodemographic variables	Magic intervention group ($n = 19$)	Control group ($n = 19$)	*P*-value
Age (years)	72.1 ± 7.6	71.8 ± 6.5	0.91
Female	14 (73.7)	13 (68.4)	0.72
Body height (cm)	155.7 ± 8.4	155.8 ± 9.0	0.95
Body weight (kg)	63.8 ± 13.5	62.1 ± 11.6	0.68
BMI (kg/m^2)	26.28 ± 4.9	25.39 ± 3.1	0.51
Married or living with partner	10 (52.6)	10 (52.6)	1.00
Higher education level[a]	5 (26.3)	4 (21.1)	0.70
Employed status	1 (5.3)	6 (31.6)	0.09
Middle or low-income	0 (0)	0 (0)	N/A
ADL	98.95 ± 3.57	100.00 ± 0.00	0.21
MMSE score	28.26 ± 1.15	27.42 ± 1.61	0.07
RSE score	27.26 ± 3.38	28.26 ± 3.80	0.40
GDS-15 score	3.53 ± 3.31	2.05 ± 2.68	0.14
WHOQOL-BREF-TW score			
Overall QOL	57.89 ± 16.78	59.21 ± 12.39	0.79
General health	53.95 ± 20.86	56.58 ± 20.14	0.70
Physical health domain	62.54 ± 12.35	66.74 ± 11.61	0.29
Psychological domain	59.21 ± 17.98	61.03 ± 12.58	0.72
Social relationships domain	61.84 ± 12.82	60.38 ± 10.42	0.70
Environment domain	70.47 ± 14.32	68.02 ± 12.33	0.58

Note: Data are expressed as mean ± standard deviation or number (%). Abbreviations: ADL, the Barthel Index of Activities of Daily Living; BMI, body mass index; GDS-15, The 15-item Geriatric Depression Scale; MMSE, Mini-Mental State Examination; RSE, Rosenberg Self-Esteem Scale; WHOQOL-BREF-TW, The brief version of the World Health Organization Quality of Life questionnaire Taiwan version. [a]Higher education level is defined as having completed more than 12 years of formal education.

effect of time ($F(1, 36) = 13.07$, $P = 0.001$, $\eta_p^2 = 0.27$, 1-$\beta = 1.00$) with the overall QOL scores post-intervention (70.07 ± 16.32) being higher than the pre-intervention scores (58.55 ± 14.56) across both groups. Although group × time interaction was non-significant ($P = 0.092$), the mean post-intervention score (74.93 ± 14.48) in the magic intervention group was higher than the pre-intervention score (57.89 ± 16.78) (Fig. 2).

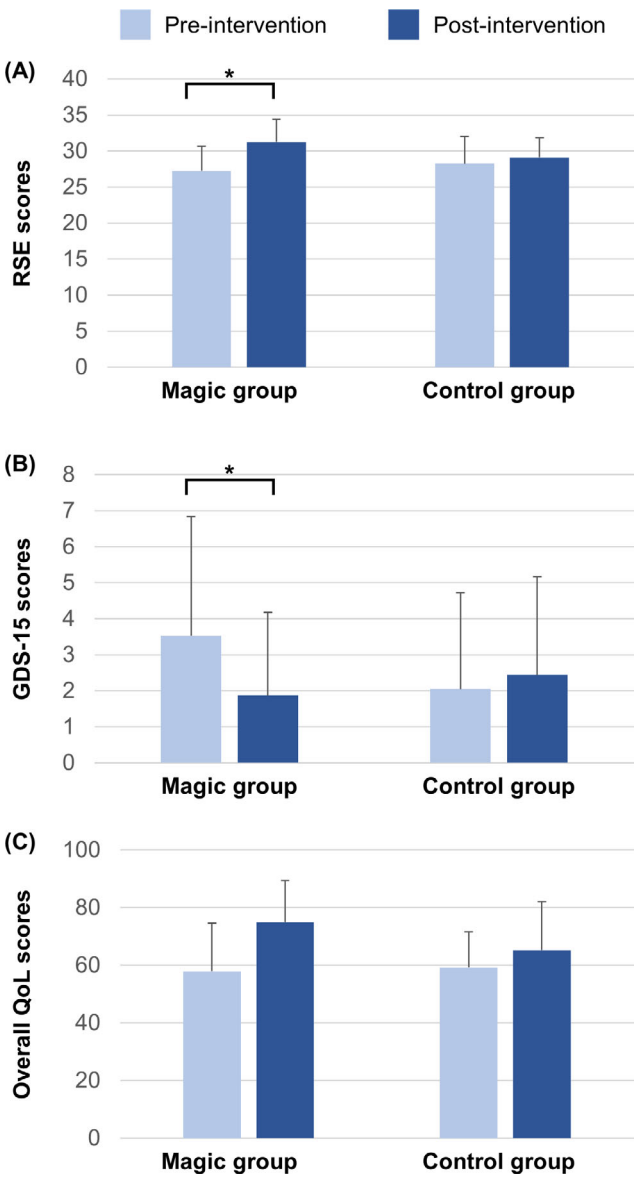

Figure 2 Comparisons of pre- and post-intervention scores. The figure shows a comparison of pre- and post-intervention scores of (A) The Rosenberg Self-Esteem Scale (RSE), (B) The 15-item Geriatric Depression Scale (GDS-15), and (C) overall quality of life in the brief version of the World Health Organization Quality of Life questionnaire Taiwan version (WHOQOL-BREF-TW) of the magic intervention group and the control group. *$P < 0.05$.

Correlations

No significant correlation was observed between the improvement in self-esteem and the reduction in depressive levels ($r = 0.02$, $P = 0.950$). Despite this, a moderate but significant negative correlation was found between the post-intervention scores of RSE and GDS-15 in the magic intervention group ($r = -0.504$, $P = 0.028$) (Fig. 3). The reduction in depressive levels was also not significantly correlated with changes in

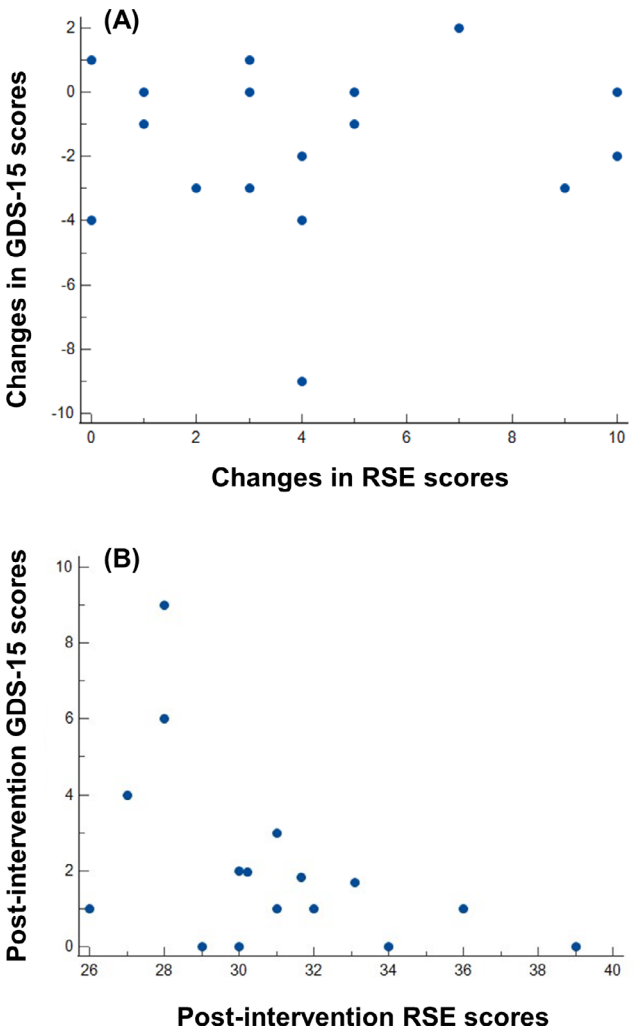

Figure 3 Correlations between Rosenberg Self-Esteem Scale (RSE) and 15-item Geriatric Depression Scale (GDS-15) scores. The figure shows correlations between (A) the improvement in RSE scores and the reduction in GDS-15 scores and (B) the post-intervention scores of RSE and GDS-15 of the magic intervention group.

overall QOL ($r = 0.23$, $P = 0.340$), general health ($r = 0.02$, $P = 0.937$), and the subdomains of physical health ($r = 0.36$, $P = 0.135$), psychological health ($r = 0.34$, $P = 0.152$), social relationships ($r = 0.25$, $P = 0.299$), and environment ($r = 0.34$, $P = 0.161$).

DISCUSSION

This study is the first to explore the effects of a 6-week magic intervention program on self-esteem, depressive symptoms, and QOL in community-dwelling older adults. Our findings, largely supporting the hypotheses proposed in this study, demonstrated that the magic intervention significantly enhanced self-esteem and reduced depressive symptoms, with large effect sizes. This suggests that this psychosocial intervention is beneficial for promoting mental health among older adults living in the community. However, the magic intervention did not significantly impact QOL. Additionally, within the magic group, the increase in RSE scores and the change in QOL scores did not show a significant correlation with the reduction in GDS-15 scores, despite a moderate yet significant negative correlation between the post-intervention RSE and GDS-15 scores.

Considering that some magic tricks involving substantial manual or cognitive dexterity could potentially have the opposite effect on self-esteem by highlighting age-related impairments, we carefully selected simple and self-working tricks for the intervention. There were three key success factors in the magic intervention program that contributed to the improvement of self-esteem and reduction of depression among participants: (i) the captivating nature of the magic effects demonstrated by the instructor left participants in awe; (ii) the production process was designed to be simple, and the performance steps were easy to follow, thus avoiding any potential frustration; (iii) the performance environment was supportive, with enthusiastic encouragement from the audience. For instance, in Lesson 2, a coin disappeared when covered with a transparent cup. The effect was intuitive and astounding, while the production process required only one cut and two glues to complete the prop. The straightforward nature of the process allowed all participants to work independently or with partial assistance. After learning magic presentation techniques, participants were given opportunities to perform, and receive applause and positive feedback from the audience and the instructor. Furthermore, to enhance the learning experience, the instructor tailored the content and pace of the class to the participants' comprehension levels, ensuring effective learning. Moreover, participants were encouraged to share their new skills with family and friends, extending the positive effects of the course to their communities.

It is worth noticing that the impacts of magic interventions on well-being can be stratified into four levels: witnessing magic, uncovering magic secrets, performing magic, and teaching magic.[26] In this study, the magic-based intervention incorporated the first three levels, demonstrating the effects on mental health through witnessing magic, uncovering magic secrets, and performing magic.

The positive impact of the magic intervention on self-esteem in this study can be attributed to the second and third levels. At the level of uncovering magic secrets, participants devised solutions to the magic tricks through ingenuity and enthusiastic discussions with peers, fostering a sense of pride[64] and positive emotions.[26] At the level of performing magic, participants gained unique knowledge and skills in performing magic tricks, positively impacting global self-esteem.[65] By performing acts considered impossible by others before an audience and receiving enthusiastic applause, participants gained self-efficacy,[43] a predictor of self-esteem for magicians.[66] Finally, performing magic for family members and friends after the course further enhanced participants' self-confidence, sense of accomplishment, and interaction with others. Audience interaction is a crucial aspect of magic performance,[67] and increased relational value and social acceptance can lead to higher self-esteem.[68]

In summary, the magic intervention program used in the present study significantly raised the participants' level of self-esteem, which is consistent with previous studies.[35–42] Prior research has suggested that interventions aimed at improving self-esteem may lead to a reduction in depressive symptoms.[17,18] The magic intervention process in our study, which encompassed witnessing magic, uncovering magic secrets, and performing magic acts, offered various plausible mechanisms that may contribute to the improvement of depressive symptoms.

At the level of witnessing magic, the instructor performed magic tricks at the beginning of each lesson, which brought awe and entertainment to the

participants and positively impacted their mood. Witnessing magic tricks can also enhance curiosity, creativity, and exploratory behaviours, leading to increased pleasure and humour.[69–71] This is consistent with studies showing that humour therapy can significantly reduce depression in community-dwelling older adults.[72,73]

Perceived social isolation strongly predicts the development of depressive symptoms.[74] Social interventions aimed at promoting interpersonal interaction can reduce such symptoms.[75] This can be explained in two ways. First, at the level of uncovering magic secrets, curiosity and surprise evoked by the magic tricks motivated participants to learn the underlying principles and knowledge behind them.[76] This led to enthusiastic discussions, building communication and social networking. Second, at the level of performing magic, interpersonal communication skills were developed. This involved eye contact, body language, and emotional control to establish a connection with an audience.[25,26]

Furthermore, the magic intervention program enabled participants to acquire several new skills such as cognitive abilities (sequencing, memory, storytelling, and execution) and gross and fine motor skills through practising magical moves and steps.[25,37,48] Building new skills has also been shown to be an important strategy in social interventions to reduce depressive symptoms.[75]

Taken together, the improvement of depressive symptoms in community-dwelling older adults in this study through magic-based intervention can be attributed not only to enhanced self-esteem but also to humour, increased social interaction, and the acquisition of new skills.

However, no significant correlation was observed between the improvement in self-esteem and the reduction in depressive levels. Nevertheless, a moderate but significant negative correlation was found between the post-intervention scores of RSE and GDS-15 in the magic intervention group, indicating that participants with higher self-esteem tend to experience fewer depressive symptoms and vice-versa. The lack of significant correlation between self-esteem improvement and reduced depressive levels might be due to a wide variation in the range of changes between participants' RSE and GDS-15 scores. Most of the changes in GDS-15 scores ranged from 0 to −4 points, while the changes in RSE scores varied widely, from 0 to 10 points (Fig. 3 (A)). In the magic group, 68.4% of participants had GDS-15 scores <5, allowing only for small decreases, whereas 84.2% of participants in the same group had RSE scores <30, providing room for substantial improvements. Consequently, declines in GDS-15 scores following increases in RSE scores may not be evident.

Although significant improvements in RSE and GDS-15 scores were observed after the magic intervention program, a statistically significant improvement in QOL was not found, likely due to the absence of a decline in QOL in the control group. Two possible explanations can account for this pattern of findings. First, the older adults in this study were community-dwelling and relatively independent in terms of ADL which could have contributed to no decline in QOL in the control group. A systematic review[23] found that social activities had a positive impact on QOL among institutionalised older adults, and QOL was maintained after the intervention while QOL declined in the control group.[77] Institutionalisation is known to have a negative impact on QOL among older people.[78]

Second, the older adults in our study did not have a major illness, which is different from previous studies demonstrating that psychosocial interventions significantly improved QOL among cancer, depression, or dementia patients, or institutionalised older adults. Furthermore, the significant beneficial effect of psychosocial interventions on QOL among community-dwelling older adults in previous studies was attributed to the maintenance of QOL in the intervention group while the QOL in the control group declined[79] or remained unchanged.[80] Notably, in a previous study, GDS-15 scores in community-dwelling older adults were ≥5.[79] Given that depression is a significant contributor to poor QOL,[4] the fact that 78.9% of the participants in this study had GDS-15 scores <5 could have made it less likely for the control group to experience a decline in QOL. Hence, it is plausible that the magic-based intervention could not produce a significant QOL benefit in our study population. This conjecture is somewhat speculative but provides a basis for future research in older adults with depression.

Magic-based intervention offers three advantages as a mental health improvement approach. First, it is cost-effective, as it does not require expensive props

and can use everyday objects to create magical effects. Second, instructions and skills can be tailored to meet individual needs, with many magic tricks being simple and easy to perform once secrets are revealed. Third, magic provides inspiration and fun due to its unique charm and appeal. Elkin and Pravder (2018) reported a terminally ill paediatric patient who only responded positively to magic therapy after other interventions failed, highlighting the potential value of magic intervention as art therapy.[32]

Although the study shows promising results regarding the effectiveness of magic interventions on mental health outcomes in community-dwelling older adults, there are limitations that future studies should address. First, the study sample only included older adults without major neurological or psychiatric diseases, which limit the generalisability of the results to other populations such as older adults with more severe depressive symptoms. Second, the study only evaluated the immediate effects of the magic intervention. Further research is needed to examine its long-term impact and the potential necessity for booster interventions. Third, the control group continued with their daily activities instead of engaging in other interventions. Future studies should involve other social or artistic activities as interventions of the control groups to better highlight the advantages of magic interventions. Lastly, given that this is the first study investigating the effects of a 6-week magic intervention on self-esteem, depressive symptoms, and QOL among community-dwelling older adults, additional research should explore the effects of varying magic intervention programs, incorporating different tricks, instructors, or course schedules.

CONCLUSIONS

Mental health interventions aimed at enhancing self-esteem and reducing depression are crucial for the older population. To our knowledge, this is the first study to demonstrate the positive impact of a magic-based intervention program on self-esteem and depressive symptoms in community-dwelling older adults. The findings indicate that the 6-week magic intervention led to significant increases in RSE scores and reductions in GDS-15 scores among older adults in the community. Thus, implementing magic programs in communities appears to be an effective strategy for promoting mental health in the older population.

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DISCLOSURE

The authors declare no potential conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

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Table S1. Processes of each magic lesson*.

Fig. S1. Pictures showcasing the various themes of the 12 magic lessons in the magic intervention program.